

What is claimed is:

1. A method for rapid and efficient purification of proteasomes from cells comprising:

- 5 a) immobilizing an amino acid sequence having a UbL domain to a solid support;
- b) exposing said immobilized UbL domain to a cell lysate;
- c) eluting non-specifically bound proteins; and
- 10 d) eluting said proteasome from said solid support, thereby purifying said proteasome from said cell lysate.

2. A method as claimed in claim 1, wherein said UbL domain has the amino acid sequence selected from the group consisting of SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:4, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, SEQ ID NO:9, SEQ ID NO:10, SEQ ID NO: 11, and SEQ ID NO: 12.

3. A method as claimed in claim 1, wherein said UbL domain and said cell lysate are isolated from the same species.

4. A kit for the rapid purification of proteasomes from a cell lysate, said kit containing: a UbL domain affixed to a solid support, one or more containers, a wash solution and an elution buffer.

5. A kit as claimed in claim 4, further comprising a solution useful in performing a purification method of the invention, selected from the group consisting of saline, buffer, diluent, and frozen cell extract.

6. A DNA construct encoding a fusion protein for assessing the proliferative potential of malignant cells comprising:

5 a) a first nucleic acid sequence encoding a promoter element; and

b) a second nucleic acid sequence encoding a UbL domain operably linked to a third nucleic acid sequence encoding a reporter gene, expression of said
10 UbL domain and said reporter gene being regulated by said promoter.

7. A DNA construct as claimed in claim 6, said
15 construct being inserted into a vector.

8. A DNA construct according to claim 6, wherein said second nucleic acid encodes a UbL domain having an amino acid sequence selected from the group
20 consisting of SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:4, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, SEQ ID NO:9, SEQ ID NO:10, SEQ ID NO: 11, and SEQ ID NO: 12.

9. A DNA construct according to claim 6, wherein said reporter gene is selected from the group of genes consisting of β galactosidase, URA3, luciferase, mammalian chloramphenicol transacetylase (CAT) gene, and green fluorescent protein (GFP) gene.

10. A method for assessing the proliferative potential of malignant cells, comprising:

a) introducing into a target cell a DNA construct encoding a fusion protein, said fusion protein comprising a UbL domain operably linked to a reporter

molecule; and

b) assessing the half-life of said fusion gene, a short half-life being indicative of a rapidly growing cell and a longer half-life being indicative of a quiescent cell.

11. A method as claimed in claim 10 wherein said UbL domain has an amino acid sequence selected from the group consisting of SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:4, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, SEQ ID NO:9, SEQ ID NO:10, SEQ ID NO: 11, and SEQ ID NO: 12.

12. A method as claimed in claim 10, wherein said reporter gene is selected from the group of genes consisting of β galactosidase, URA3, luciferase, mammalian chloramphenicol transacetylase (CAT) gene, and green fluorescent protein (GFP) gene. consisting of

13. A DNA construct encoding a thermostable fusion protein, comprising a first nucleic acid sequence encoding a UbL domain operably linked to a second nucleic acid sequence encoding a protein of interest.

14. A DNA construct as claimed in claim 11, wherein said first nucleic acid sequence encodes a UbL domain having an amino acid sequence selected from the group consisting of SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:4, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, SEQ ID NO:9, SEQ ID NO:10, SEQ ID NO: 11, and SEQ ID NO: 12.

15. A DNA construct as claimed in claim 11, wherein said second nucleic acid molecule encodes a polymerase enzyme.

16. A DNA construct encoding a fusion protein for selecting for drug resistance in malignant cells comprising:

a) a first nucleic acid sequence encoding a promoter element; and

b) a second nucleic acid sequence encoding a UbL domain operably linked to a third nucleic acid sequence encoding a selectable marker gene, expression of said UbL domain and said selectable marker gene being regulated by said promoter.

17. A DNA construct as claimed in claim 16, wherein said second nucleic acid gene encodes a UbL domain having a sequence selected from the group consisting of SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:4, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, SEQ ID NO:9, SEQ ID NO:10, SEQ ID NO: 11, and SEQ ID NO: 12.

18. A DNA construct as claimed in claim 16, wherein said selectable marker gene is selected from the group consisting of the neomycin gene, or antibiotic resistance genes.